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ABSTRACT

The Mississippi State Department of Education is conducting statewide technological upgrading of schools to allow for extensive student involvement. Teachers need professional development in this area, since they must be proficient in teaching problem-solving techniques and assessing student achievement using computer technology. One of the mechanisms currently addressing the need for strengthening student problem- solving skills through research and environmental awareness is GLOBE (Global Learning and Observations to Benefit the Environment), a hands-on international environmental science and education program which promotes heightened achievement in science and mathematics. Professional development is provided for teachers through environmental research and environmental science education programs. GLOBE is a worldwide network of teachers, students, and scientists collaborating to learn more about the environment and environmental research. GLOBE participants explore daily local changes in the earth's conditions, adding to the worldwide database. Teachers learn to lead student scientists in data collection and in sharing their findings with others worldwide via the Internet. GLOBE provides a technological base for student involvement in inquiry-based investigations. Its educational elements include: instructions for selecting local study sites, taking regular measurements, submitting data, participating in learning activities, using GLOBE systems on the Internet to communicate, and promoting student investigations. Teachers in Oktibbeha County received GLOBE training at Mississippi State University. Participants completed the Problem-Solving Inventory before and after the workshop and evaluated the GLOBE program. Results indicated they found it very helpful. (SM)

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# Hands-0n Scientific Research: Conducting GLOBE Project Protocol Training in Oktibbeha County

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Paper presented at the Mid-South Educational Research Association
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**Hands-0n Scientific Research: Conducting GLOBE**

**Project Protocol Training**

**in Oktibbeha County**

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Professional development for teachers in Mississippi has undergone tremendous change in the last few years. No longer will teachers receive all of their staff development hours required for certification and renewal of their contracts at their respective schools. All teachers are now required to obtain college credit in their areas of certification. Math, science, and special education in Mississippi are all considered areas of critical need. Mississippi State University strives to supply courses that will benefit the teacher population, and in doing so, fill classrooms with teachers well-equipped with hands-on problem-solving activities needed to improve achievement test scores used by the State Department of Education in determining the status level of each school. All of this information is published annually in the *Mississippi Report Card* (1997).

The teaching profession is an extremely demanding occupation in itself. With the new requirements for college credit, teachers need credit hours to satisfy the state requirements. Coupled with this, the increasing enrollment of about one-half million

students in public schools brings with it an increased demand for teachers which places additional burdens on the above mentioned critical need areas in school districts. Providing opportunities for easing these needs of the teachers to constantly upgrade problem-solving skills and promote teacher satisfaction for retention of experienced teachers is of utmost importance.

The Mississippi State Department of Education is presently involved in a state-wide technological upgrading of schools to allow for extensive student involvement. This essential incorporation of computer technology into the classroom brings with it still further demands on already overburdened teachers due to increasingly larger class sizes, new curricular requirements, and accountability of student progress. Statistics reported by The National Education Goals Report indicate that in 1994 about 50% of the professional development participation of teachers dealt with technology and assessment. To be successful, teachers need secure confidence levels in all of these aforementioned areas.

Newly developed assessment standards in Mississippi require students to complete hands-on activities that are evaluated by classroom teachers. This dual role of teacher-evaluator accentuates the need for teacher proficiency in both the teaching of problem-solving techniques and the assessment of student achievement. Evaluation of this type cannot be accomplished with the traditional paper and pencil format.

Because success in life is dependent on problem-solving skill and being able to fit all of the segments together for survival, the question of how to incorporate

integration of subject matter is being debated all around the world. Students and teachers alike are affected by this need to supply sophisticated means to meet constantly changing environmental concerns both in school and in the earthly domain.

One of the mechanisms currently addressing the need for strengthening student problem-solving skill through research and environmental awareness is the GLOBE Program, a hands-on international environmental science and education program. It is designed to promote heightened achievement in science and mathematics. Professional development is provided for teachers through both environmental research and environmental science education programs. GLOBE training for teachers additionally provides a complete series of activities that allow the students to become research scientists.

GLOBE (Global Learning and Observations to Benefit the Environment) is a worldwide network of teachers, students, and scientists collaborating to literally "map the globe" and, in doing so, learn more about the environment and how research is conducted. Teachers are instructed in how to lead their "student scientists" in data collection at their individual schools and in sharing their findings with other students and scientists around the world through the Internet. Students' interest in science blossoms as they see how their data generates new findings about planet earth.

GLOBE offers many advantages in that it provides a technological base for student involvement in inquiry-based investigations. Included in the six educational elements of the program are instructions for selecting local study sites, taking measurements on a regular basis, submitting data, participating in learning activities,

using GLOBE systems on the Internet to communicate, and promoting student investigations. In all of these, student accuracy, question formulation, hypothesis testing, and theory development promote problem-solving. Calibration and use of a variety of scientific instruments bring hands-on science to the teachers through professional development sessions. The students benefit from the teachers' experiences as they share their expertise.

As researchers, the participants in GLOBE training are actively involved in exploring local day to day changes in conditions of the earth. Adding to the world-wide data base helps the participants to understand how the earth and its integrated systems work. By communicating with researchers from around the world through the Internet, participants gain valuable hands-on computer skills. The participants actually enter their own data into the computer and immediately are able to make comparisons and analyses of their research.

In addition to hands-on computer skills, the new research participants explore various areas of study. Investigations of the atmosphere consist of daily measurements of air temperature, cloud cover, and precipitation. Weekly and monthly measurements of water temperature, dissolved oxygen, pH, alkalinity and conductivity of water allow hydrology studies. Observation of local land cover types and related biological measurements allow comparisons of actual measurements with images of the same area taken from space by the Landsat satellite. Soil moisture and content are determined from soil samples from various depths and locations.

Knowing the exact location of the study site is possible with a new technology, Global Positioning Systems (GPS), which allows the participants to determine latitude, longitude, and elevation, through the combined use of a small hand-held receiver and a system of Earth-orbiting satellites. This is essential in recording the scientific data for the proper location.

Having determined the world-wide location of the collection sites, the participants eventually investigate annual seasonal changes in their study sites and around the world. Using the compilation of the data fosters skill development of scientific investigation in observing how all of the components of the earth are inter-related.

The emphasis of the inter-relatedness of the earth enables the participants to recognize the inter-relatedness of every segment of their own lives in dealing with their own problem-solving ability. The Problem-Solving Inventory (PSI) determines the problem solving perception of the participants, not their actual problem-solving ability. Research is presently underway to investigate the relationship between actual problem-solving ability and perceived problem-solving ability.

Preservice secondary science teachers at Mississippi State University are receiving GLOBE training. Along with the methods of teaching science, preservice science teachers also participate in GLOBE protocols. Having students graduate with GLOBE knowledge will expand the possibility of increased data collection in Mississippi schools.

With the aid of a Mississippi State University (MSU) Public School Partnership Grant, teachers in Oktibbeha County were trained during a four-day workshop at Mississippi State University. The project "Hands-on Scientific Research: Implementing GLOBE Project Protocols in Oktibbeha County Schools" was coordinated by the three GLOBE trainers at Mississippi State University. The participating Oktibbeha County schools and teachers are listed as follows: Alexander Elementary School - Gwen Jernigan; Moor Attendance Center - Bertha Bush, Annie Love, Flora Fortune; O. L. Wicks Elementary School - Gloria Morgan; and Sturgis Attendance Center - Leon Peterson and Teresa Sappington.

The GLOBE trainers who volunteered their time to serve as facilitators for the workshop were Dr. Burnette Hamil (Curriculum and Instruction), Dr. Taha Mzoughi (Physics), and Dr. Giselle Thibaudeau (Biological Sciences). Follow-up visits to the schools were made by the trainers to offer further assistance to the schools. Preservice teachers worked closely with the teachers in the schools while each enhanced their own GLOBE skills in becoming more familiar with the implementation procedures of the protocols. The Mississippi State University Public School Partnership Grant provided GLOBE supplies for the four participating schools while the Oktibbeha County School District allowed the teachers leave time to attend the four-day workshop and provided substitutes for their classrooms while they were away from their respective schools.

Before the workshop began and at the completion of the workshop, the teachers responded to The Problem Solving Inventory. Additionally, at the

completion of the workshop teachers responded to a survey provided by GLOBE to collect pertinent information useful in planning future workshops.

On the GLOBE Workshop Participant Evaluation Form teachers were asked to respond to the statement, " Overall, I think the GLOBE Program...."

Actual comments that were given are as follows: (1) Overall, I think the GLOBE Program....." was excellent. The presenters were well prepared. Their personalities were great. This was the best workshop that I've attended. Keep up the good work. On a scale of 1 to 10 I give you a 10." (2) Overall, I think the GLOBE Program..... was excellent. I can't wait to get my ID # and get everything organized." (3) Overall, I think the GLOBE Program..... is great. It offers a lot of information that's needed in the classroom and community."

## References

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